

CLAIMS

1. A method for producing a genetically transformed plant which exhibits toxicity toward Coleopteran insects which comprises the steps of:

(a) inserting into the genome of a plant cell a chimeric gene which comprises in sequence:

i) a promoter which functions in plants to cause the production of RNA;

ii) a DNA sequence that causes the production of a RNA sequence encoding a Coleopteran-type toxin protein of *Bacillus thuringiensis*; and

iii) a 3' non-translated DNA sequence which functions in plant cells to cause the addition of polyadenylate nucleotides to the 3' end of the RNA sequence;

(b) obtaining transformed plant cells; and

(c) regenerating from the transformed plant cells genetically transformed plants exhibiting resistance to Coleopteran insects.

2. A method of Claim 1 in which the promoter is selected from the group consisting of CaMV35S promoter, MAS promoter and ssRUBISCO promoters.

3. A method of Claim 1 in which the DNA sequence encoding a Coleopteran-type toxin protein is from *Bacillus thuringiensis* var. *tenebrionis*.

5. A method of Claim 3 in which the promoter is the CaMV35S promoter.

7. A method of Claim 5 in which the 3' non-translated DNA sequence is from the soybean storage protein gene.

9. A chimeric plant gene comprising in sequence:

- (a) a promoter which functions in plants to cause the production of RNA;
- (b) a DNA sequence that causes the production of a RNA sequence encoding a Coleopteran-type toxin protein of *Bacillus thuringiensis*; and
- (c) a 3' non-translated DNA sequence which functions in plant cells to cause the addition of polyadenylate nucleotides to the 3' end of the RNA sequence;

10. A gene of Claim 9 in which the promoter is selected from the group consisting of CaMV35S promoter, MAS promoter and ssRUBISCO promoters.

11. A gene of Claim 9 in which the DNA sequence encoding a Coleopteran-type toxin protein is from *Bacillus thuringiensis* var. *tenebrionis*.

12. A gene of Claim 9 in which the DNA sequence encoding a Coleopteran-type toxin protein is from *Bacillus thuringiensis* var. *san diego*.

13. A gene of Claim 11 in which the promoter is the CaMV35S promoter.

14. A gene of Claim 11 in which the promoter is the mannopine synthase promoter.

5 15. A gene of Claim 13 in which the 3' non-translated DNA sequence is from the soybean storage protein gene.

16. A gene of Claim 13 in which the promoter contains an additional enhancer sequence.

10 17. A transformed plant cell containing a chimeric gene comprising in sequence:

(a) a promoter which functions in plants to cause the production of bacterial RNA;

15 (b) a DNA sequence that causes the production of a RNA sequence encoding a Coleopteran-type toxin protein of *Bacillus thuringiensis*; and

20 (c) a 3' non-translated DNA sequence which functions in plant cells to cause the addition of polyadenylate nucleotides to the 3' end of the RNA sequence;

25 18. A cell of Claim 17 in which the promoter is selected from the group consisting of CaMV35S promoter, MAS promoter and ssRUBISCO promoters.

19. A cell of Claim 17 in which the DNA sequence encoding a Coleopteran-type toxin protein is from *Bacillus thuringiensis* var. *tenebrionis*.

30 20. A cell of Claim 17 in which the DNA sequence encoding a Coleopteran-type toxin protein is from *Bacillus thuringiensis* var. *san diego*.

21. A cell of Claim 19 in which the promoter is the CaMV35S promoter.

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22. A cell of Claim 19 in which the promoter is the mannopine synthase promoter.

5 23. A cell of Claim 21 in which the 3' non-translated DNA sequence is from the soybean storage protein gene.

24. A cell of Claim 17 in which the plant is selected from the group consisting of tomato, potato, cotton and maize.

10 25. A differentiated plant exhibiting toxicity toward susceptible Coleopteran insects comprising transformed plant cells of Claim 17.

26. A plant of Claim 25 in which the plant is tomato.

15 27. A plant of Claim 25 in which the plant is potato.

28. A plant of Claim 25 in which the plant is cotton.

20 29. A plant transformation vector comprising a chimeric plant gene of Claim 9.

30 30. A vector of Claim 29 comprising a gene of Claim 10.

31. A vector of Claim 29 comprising a gene of Claim 11.

25 32. A vector of Claim 29 comprising a gene of Claim 13.

33. A vector of Claim 29 comprising a gene of Claim 12.

34. A vector of Claim 29 comprising a gene of Claim 13.

30 35. A vector of Claim 29 comprising a gene of Claim 14.

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5 36. A gene of Claim 16 in which the enhanced CaMV35S promoter contains additional enhancer DNA sequence corresponding to the DNA sequence -343 to -90, said enhanced promoter having the sequence shown in Figure 18.

X 37. A toxin protein having the amino acid sequence (1-644) shown in Figure 10.

38. A toxin protein of Claim 37 in which the N-terminal 15 amino acids have been removed.

10 39. A toxin protein of Claim 37 in which the N-terminal 47 amino acids have been removed.

40. A toxin protein of Claim 37 in which the N-terminal 48 amino acids have been removed.

15 41. A toxin protein of Claim 37 in which the N-terminal 57 amino acids have been removed.

42. A toxin protein of Claim 37 in which the N-terminal 76 amino acids have been removed.

X 43. A gene of Claim 9 encoding the toxin protein of Claim 37.

20 44. A gene of Claim 9 encoding the toxin protein of Claim 38.

45. A gene of Claim 9 encoding the toxin protein of Claim 39.

25 46. A gene of Claim 9 encoding the toxin protein of Claim 40.

47. A gene of Claim 9 encoding the toxin protein of Claim 41.

30 48. A gene of Claim 9 encoding the toxin protein of Claim 42.

49. A seed produced from a plant of Claim 25.

50. A seed of Claim 49 in which the plant is tomato.

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51. A seed of Claim 49 in which the plant is potato.

52. A seed of Claim 49 in which the plant is cotton.

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